202301UECM2453OE1b

Start again

Review of preview

Started on	Monday, 6 February 2023, 01:08 PM
Completed on	Monday, 6 February 2023, 01:08 PM
Time taken	8 secs
Grade	**0** out of a maximum of 10 (**0**%)

1

Marks: 1

The time-t price of a stock, S(t), follows the Ito process

$$dS(t)/S(t) = 0.11dt + 0.37dZ(t).$$

The initial price of the stock, S(0), is 70. A 9-month European call option on the stock has strike price 80.0. Calculate the expected payoff of the call option, given that it is pays off. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 21.4952
Marks for this submission: 0/1.

2

Marks: 1

For a nondivedend paying stock with price S(t) at time t, you are given:

- S(0) = 90
- The continuously compounded expected annual rate of return is 0.12.
- The volatility is 0.21.
- $G = [S(1/12)S(2/12)S(3/12)]^{1/3}$.

Calculate E[(G-73.5)I(G > 73.5)|G>73.5]. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 18.279943
Marks for this submission: 0/1.

3

Marks: 1

Consider two assets X and Y. There is a single source of uncertainty which is captured by a standard Brownian motion Z(t). The stochastic process of X satisfies the stochastic differential equations

$$d\ln [X(t)] = 0.03dt + \sigma\, dZ(t),\ \sigma > 0$$

while the price of Y stisfies

$$Y(t) = 180e^{0.08667t+0.2Z(t)}.$$

You are also given that

- Y pays dividends continuously at a rate proportional to its price. The dividend yield is 0.035.
- X is nondividend-paying.
- The continuously compounded risk-free interest rate is 0.059

Determine σ. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 0.8917
Marks for this submission: 0/1.

4
Marks: 1

Let S(t) be the time-t price of a nondividend-paying stock. The price process for S(t) is

$$dS(t) = 0.29S(t)dt + 0.038S(t)dZ(t)$$

where Z(t) is a standard Brownian motion. The continuously compounded risk-free rate is 0.12. For another nondividend-paying stock whose time-t price is Q(t):

- Q(0) = 80
- P(Q(1) ≥ 90) = 0.94
- dQ(t) = AQ(t)dt + BQ(t)dZ(t) with B < 1.

Determine A. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 0.116421
Marks for this submission: 0/1.

5
Marks: 1

Let S(t) be the time-t price of a stock, and V(t) is the time-t price of a derivative security of the stock. You are given:

- $V(t) = e^{0.04}(0.029t+\ln s(t))$.
- The continuously compounded risk free interest rate is 0.04.
- The stock pays dividends of 0.049S(t)dt between times t and t+dt.
- The derivative security does not pay dividends.

Determine σ^2, the square of volatility of the stock. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 0.04
Marks for this submission: 0/1.

6
Marks: 1

You are given:

- S(t) is the time-t price of a stock.
- The stock pays dividend continuously at a constant rate proportional to its price.
- The true stock price process is given by

  $$dS(t)/S(t) = cdt + \sigma\, dZ(t)$$

  where Z(t) is a standard Brownian motion under the true probability measure, and c and σ are constant.
- The risk-neutral stock price process is given by

  $$dS(t)/S(t) = 0.054dt + 0.17\, d\tilde{Z}(t)$$

  where $\tilde{Z}(t)$ is a standard Brownian motion under the risk-neutral measure.
- $Z(6) = \tilde{Z}(6) - 2.64$.

Find c. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 0.1288
Marks for this submission: 0/1.

7
Marks: 1

Let S(t) be the time-t price of a nondividend-paying stock. You are given

- The true stochastic process of S(t) is

  $$d[\ln S(t)] = 0.15dt + 0.3dZ(t)$$

  where Z(t) is a standard Brownian motion under the true probability measure.
- For $0 \le t \le T$, the time-t prepaid forward price for a delivery of 1 share of S^5 at time T is $F_{t,T}^P(S^5)$. The risk-neutral stochastic process of $F_{t,T}^P(S^5)$ is

$$d[\ln F_{t,T}^{P}(S^5)] = gdt + hd\tilde{} Z(t)$$

where ˜Z(t) is a standard Brownian motion under the risk neutral measure.

- The continuously compounded risk-free interest rate is 0.08. Find g _____

Answer: ✗

Make comment or override grade

Incorrect
Correct answer: -1.045
Marks for this submission: 0/1.

8
Marks: 1

Assume the Black-Scholes framework for a nondividend-paying stock whose volatility is 21%. A contingent claim pays $S(4)S(3)/S^2(2)$ at time 4. Calculate the time-1 price of the contingent claim. _____

Answer: ✗

Make comment or override grade

Incorrect
Correct answer: 1.0451
Marks for this submission: 0/1.

9
Marks: 1

Let S(t) be the time-t price of a nondividend-paying stock, you are given that:

- The stock price process under the true probability measure is

$$d\ln S(t) = -0.00545dt + 0.37dZ(t),\ S(0) = 1$$

where Z(t) is a standard Brownian motion under the true probability measure.

- The sharpe ratio stock price risk is 0.06216.

Compute the price of a contingent claim that pays $S^{1/5}(3)$ at time 3. _____

Answer: ✗

Make comment or override grade

Incorrect
Correct answer: 0.8791
Marks for this submission: 0/1.

10
Marks: 1

Let S(t) be the time-t price of a nondividend-paying stock, you are given that:

- The stock price process is

$$d\ln S(t)] = 0.31dZ(t)$$

where Z(t) is a standard Brownian motion under the true probability measure.

- The continuously compounded risk-free of interest is 0.044

If $F^{P}_{0,5}(S^5) = e^{-\gamma} E[S^5(5)]$, find γ. _____

Answer: ✗

Make comment or override grade

Incorrect
Correct answer: 0.32125
Marks for this submission: 0/1.